African Research Review

An International Multi-Disciplinary Journal, Ethiopia
Vol. 3 (5), October, 2009
ISSN 1994-9057 (Print) ISSN 2070-0083 (Online)

Information and Communication Technology and Bank Performance: The Case of Nigerian Commercial Banks.

Akujuobi, Linus Eze - Department of Financial Management Technology, School of Management Technology, Federal University of Technology, Owerri, Nigeria.
leakujuobi@yahoo.com

Akujuobi, A.B.C. **-** Department of Financial Management Technology, School of Management Technology, Federal University of Technology, Owerri, Nigeria.
aghabcakujuobi@yahoo.com

Abstract
Different sectors of world economies are rapidly being affected by improved technology. Banking sector is also witnessing the trend in Nigeria. Information and communication Technology is said to have impacted the banking sector massively as the banks in Nigeria introduce products that would help improve their efficiency. The heavy investment in this area has led people into questioning the associated gains. This paper therefore, investigates the impact of these new technologies on the performance of the Nigerian banks for the period 1970 to 2008, using the t-ratio (difference between means) and found that the introduction of information technology has positively impacted on the performance of the banks.

Key words*:* Information communication technology, performance, banking, new generation banks.

Introduction

The recent development in Information and Communication Technology (ICT) has no doubt brought with it dramatic changes in the way businesses are conducted worldwide. Smith (1776) had first noted that technological changes in form of new machines are invariably one of the three important causes of increasing incomes. Neither has this notion changed, especially in the face of the recent infusion of technological advances nor electronic-commerce into commercial activities.

Accordingly, the consensus among scholars is that internet has fundamentally changed the rules of the game, with its impact felt across industries (Acha, 2008; Aladwani, 2001 and Gwnasekaran and Love, 1999). This raging wave is such that banks are now being forced to introduce and quickly upgrade their front-end internet applications in order to be competitively relevant.

Surprisingly and as observed by Gurau (2000), even with the growing interest in the introduction and development of internet banking, not much research seems to have been done on the implementation of internet banking in the transition economies like Nigeria. For instance, the banking industry in Nigeria has continued to undergo thorough complex changes in recent times, such that banks now adopt several survival strategies in the face of keen competition. This advent of electronic-banking (e-banking) and its attendant myriads of product development have been predicted to bring about dramatic changes in both the distribution channel structure of retail banks and the general bank performance (Tilden, 1996).

Past studies in this area have been more of theoretical constructs, with the effect that none attempted, at least empirically, to ascertain the influence of the introduction of ICT cum e-banking on the performance of banks in Nigeria (Acha, 2008; Agundu, 2007; Ayandele and Adeoye, 2006 and Oluyemi, 2001). Obviously, one would have expected such a study to provide the empirical basis to either support or discourage more investment into the adoption of e-banking in Nigeria. Consequently, this study seeks to fill this yawning gap as it is a foray into the impact of ICT / electronic-banking on bank performance in Nigeria.

Hence this study is based on the null hypothesis that the introduction of ICT has not significantly affected the level of commercial banks' performance in Nigeria. To do this, the period is divided between the pre- and post-ICT periods. To follow this introduction is the next section, which deals with the

theoretical discussions and literature review. The third section is on the empirical investigation of the impact of ICT on bank performance with highlights of the findings. The paper ends the section that deals with conclusion and recommendations.

Literature Review and Theoretical Discussions

Information and Communication Technology (ICT) can be defined as the modern handling of information by electronic means, which involves its access, storage, processing, transportation or transfer and delivery (Ige, 1995). Research shows that ICT affects financial institutions by easing enquiry, saving time, and improving service delivery (Ali, 2002).

Banking like most industries, has been transformed by technological innovations. These have made it possible to offer alternative delivery channels for services such as Automated Teller Machines (ATMs), Electronic Banking (Internet Banking), Credit and Debit Cards, and execution of payments through Electronic Funds Transfer at the point of sale (EFTPOS). While most of these have been the norm in the developed world, it is rapidly catching on in Nigeria but at varying paces for different African countries. Some other available telecommunication and information technologies which are presently being used in the banking industry in Nigeria are telephone, facsimile, wireless radiophone, very small aperture terminal satellites (VSAT), telegraphy and computer systems (Ugwu, 1999).

World Bank Group (2006) in a study on the impact of information and communications technology on enterprises found that ICT had great impact on labour productivity in businesses, but added that it may probably be because such enterprises that use information technology more intensively are more capital intensive overall.

On its own, Pilat (2002) wrote of how OECD stated the need for the study of the impact of information and Communications Technology (ICT) on firm performance, noting that firm-level studies of this contribute to a better understanding of the drivers of economic performance and better policy making. In line with this, Chen and Zhu (2004) recognized that the link between information technology (IT) investment and firm performance is indirect due to the effect of mediating and moderating variables. They developed an efficiency model that identifies the efficient frontier of a two-stage production process linked by intermediate measures.

Wu (2006) tried to detect the impact of information technology on firm performance using Data Envelopment Analysis (DEA) and Decision Trees (DTs) and found strong positive impact. Info Dev (2008) did a multi-country study of Poland, Russia and the Baltic countries and found that ICT plays an important role in facilitating the modernization and improved economic performance of firms in transition economies. On the other hand, Malhotra and Singh (2006) did a country-specific study on the impact of internet banking on bank's performance in India that confirmed a positive impact. Furthermore, Amin (2005) investigated the relationship between ICT and firm performance and found that the ICT use was strongly correlated with innovation and better performance in Thailand.

In his study of the Tanzanian situation, Mboma (2006), found that customers in the country found satisfaction in their use of ATM cards which also helped in their performance. In Nigeria, researchers have mainly focused on regulatory and security implications of the technology. For instance, Oghenerukeybe (2009) studied customers' perception of security indicators in online banking sites and found that security indicators (SIs) are not effective at alerting and shielding users from revealing sensitive information to spoofed sites. This led to her recommending that banks develop effective security strategies for the future of electronic banking in Nigeria.

However, there seems to exist a dearth of empirical studies on the influence of electronic banking on the performance of banks in Nigeria. Consequently, this study is on the influence of electronic banking on bank performance in Nigeria.

Empirical Investigation of the Impact of Ict on Nigerian Commercial Banks

The study covers the period, 1970-2008, while adopting the t-test to test the difference between the two means of the pre- and post- ICT periods as the main statistical tool of analysis. Hence, because of the nature of our report and central objective, the study period, 1970-2008, is divided into two sub-periods, from 1970-1991 and 1992-2008, as the pre-ICT and post-ICT periods respectively. The reason for this separation appears cogent. First, there is need to compare the performance of banks between the periods before and after the commencement of the Internet Banking System (pre- and post-ICT periods). Second, the first real online banking started with the founding of the new generation banks (e.g. Diamond Bank of Nigeria PLC; Zenith Bank of Nigeria PLC, etc) in about 1990, with other Nigerian

commercial banks joining about a year later. Hence, the ICT commencement period is taken to be 1991 for the Nigerian banking industry.

Model Specification

The variables for the study are hereunder denoted as follows:

PRETOTCR = Level of Pre-ICT commercial bank total credit in year t;
POSTTOTCR = Level of Post-ICT commercial bank total credit in year t;
PRETOTINVST = Level of Pre-ICT commercial bank total investment in year t;
POSTTOTINVST = Level of Post-ICT commercial bank total investment in year t;
PREDDEPOT = Level of Pre-ICT commercial bank total demand deposit in year t;
POSTDDEPOT = Level of Post-ICT commercial bank total demand deposit in year t;
PRESAVS = Level of Pre-ICT commercial bank total savings deposit in year t;
POSTSAVS = Level of Post-ICT commercial bank total savings deposit in year t;
PRETMDEPOT = Level of Pre-ICT commercial bank total time deposit in year t;
POSTTMDEPOT = Level of Post-ICT commercial bank total time deposit in year t;
PRETOTDEP = Level of Pre-ICT commercial bank total deposit in year t;
POSTTOTDEP = Level of Post-ICT commercial bank total deposit in year t;
PREFORCURN = Level of Pre-ICT commercial bank total foreign currency reserve in year t;
POSTFORCURN = Level of Post-ICT commercial bank total foreign currency reserve in year t.

Data Presentation

Hypotheses Testing and Data Analysis

The difference between two means is the tool utilized to estimate the degree of difference in levels of the selected variables in the pre-ICT and post-ICT periods.

$$T - Ratio = \frac{Mean_A - Mean_B}{\text{Standard error of the difference between } mean_A \text{ and } mean_B}$$

Where,

$(n_A+n_B - 2)$ = the degrees of freedom of the test

X_A = means of group A

X_B = mean of group B

S^2_A = variance of group A

S^2_B = variance of group B

n_A = number of observations (pre-ICT)

n_B = number of observation (post-ICT)

This hypothesis stated as follows:

Ho_1: $U_A = U_B = O$: The introduction of ICT has not significantly affected the level of commercial banks performance in Nigeria during the pre- and post-ICT periods.

Ha_1: $U_A \neq U_B \neq o$: The introduction of ICT has significantly affected the level of commercial banks performance in Nigeria during the pre- and post-ICT periods.

Decision Rule

Since t-cal (5.85, 5.30, 4.97, 4.88, 4.66, 4.47, 4.30) > t-tab (2.7045, 2.0211) at both the 1% and 5% levels of probability, we reject Ho and accept Ha to conclude that a significant difference exists between the level of bank performance during the pre-and post-ICT periods.

The results of Table 2 have been quite revealing with all the commercial banks' performance indicators proving significant at even 1% alpha level. It then follows that a high significant difference exists in the performance of the bank between the two periods. However, while the highest contribution came through the savings deposits of commercial banks, the least contribution resulted from total investment of commercial banks.

Therefore, following savings are the foreign currency reserve, demand deposit, total deposit, and total credit of Nigerian commercial banks, for the

period under investigation, 1970-2008. The order of contribution is depicted as;

SAV >FORCURN >DDEPOT >TOTDEP >TOCR >TMDPOT>TOTNVST

(5.85) (5.30) (4.97) (4.88) (4.66) (4.47) (4.30)

Conclusion and Recommendation

Conclusion

Following our findings, the paper concludes that:

1. The post ICT era was more efficient and has a high significant relationship on the general performance of the banking system in Nigeria.
2. The Introduction of the ICT has brought significant impact on the general banking system.

Recommendation

On the strength of the above findings and conclusion, the study offers the following recommendations:

1. The use of ICT needs to be encouraged among banks.
2. Similarly, banks need to regularly re-train their staff so as to keep abreast with the new developments in the ICT world.

References

Acha, I. A.(2008) Electronic Banking in Nigeria: Concepts, Challenges and Prospects *International Journal of Development and Management Review,* Vol.3, No. 1 May,pp88-97

Adetayo, J. O. Sanni, S. A. and Ilori M. O. (1999): The impact of information technology on product marketing: A case study of multinational company in Nigeria.

Agund,P .U . C (2007), ATM systems in Nigerian banks: The wind of change. *Journal of Research in National Development*. 5(2) pp 144-149.

Akbulut, A. Y. (2002), An investigation of the factors that influence electronic information sharing between state and local agencies.

Aladwani, A . M. (2001), Online banking: A field study of drivers, development challenges, and expectations, *International Journal Information Management*, Vol. 21, pp213-225.

Amin,M (2005), ICT and firm-level performance in Thailand: Findings of the productivity and investment climate survey. Proceedings of the second international conference on e-learning for knowledge-based society, August 4-7 2005, Bangkok Thailand.

Anyandele, I. A. and O . S . Adeoye.(2006), The problems and prospects of information processing and utilization via the internet: *The Nigerian Perspective Contribution to Business Economy*. Vol. XXV. NO.1. Federal Reserve Bank of Chicago

Banker, R. D. and Kaufman, R. J. (2004): The evolution of information systems: A fiftieth year survey in literature in, *Management Science.*

Beulty, R. C., Shim, J. P., and Jones, M.C. (2001): Factors influencing corporate website: A time- based assessment.

Bill G. (1996), Banking on a high – tech future, *Chartered Institute of Bankers*, Bankers Book, Emmanuel House, 4-9 Burgate Lane, Canterbury, Kent 2, (4) p20.

Callender, B. (1996): Speech Given at a Conference in Hong Kong and Singapore.

Chen, Y and Zhu, J (2004), measuring information technology's indirect impact on firm performance, *Information Technology and Management,(5) pp 9-22.*

Choi, S. and Winton, A (2000), Benefits and requirements for interoperability in electronic marketplace, *Technology in Society*, 22, pp 33-44.

Chung, W. and Payter, J. (2002), An evaluation of internet banking in New Zealand.

Chwelos, P., Banbasat, and Dexter, A. S. (2001), Research report: Empirical text of an EDI Adoption Model, *Information Systems Research, 12(3), pp 304-21.*

Clarke, G. R. (2001), How enterprise ownership and foreign competition affect internet Access in Eastern Europe and Central Asia, World Bank Policy Research Working Paper 2629.

Cohen, W., and Levinthal D. (1990), Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly ,pp* 128-152

Craig, P. B. and King, M. (1993), Small-firm computing: Motivators and inhibitors. *MIS Quarterly*, 17(1), 47-60

David, R. (1982), IT and banking systems, *Journal of the Institute of Bankers.* Heudley Brothers Ltd. London, 103, (3) pp. 77- 78

Davis, F.D. (1989), Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly*, 13(3), pp 319-340

Dewan, S., and Kraemer, K. L. (2000), Information technology and productivity: Preliminary evidence from country- level data, *Management Science, 46(4),* pp 548-562.

Epstein, M. J. (2004), *Implementing E-Commerce Strategies: A Guide to Corporate Success Offer the Dot. Com Bust.* Westernport: Praeger Publishers.

Fichman, R. G. (2000), The diffusion and assimilation of information technology innovations: Protecting the future through the past, Cincinnati: Pinaflex. , pp 105-127

Gunasekaran, A .and Love, P. (1999),current and future directions of multimedia technology *Business International Journal of Information Management* , 19,(2)pp105-120.

Gurau, C. (2002), Online banking in transition economies: The implementation and development of online banking systems in Romania20/6, pp285-296

Ezeoha A. S. (2006), Regulating internet banking in Nigeria: Problems and challenges *part 1; Journal of Internet Banking and Commerce*, 10(3)

Georges F. (1997), Electronic commerce: A new economic and policy Area, *Journal of Internet Banking and Commerce,* 2(4)

Guardia, N. D. (2001), *Regulating E-Commerce in Financial Services*, Center for European Policy Studies.

Ige, O. (1995),Information Technology in Deregulated Telecommunications Environment Key Note Address, INFOTECH 95, First International Conference on Information Technology Management, Lagos, Nov. 16-17

InfoDev(2008), ICT. Innovation and economic growth in transition economies: A multi-country study of Poland, Russia and Baltic countries, http://www.infodev.org/en/Article.247.html, retrieved on 29th May 2009.

Kamel, S. (Ed.) (2006), Electronic business in developing countries: Opportunities and challenges.

Kim, C. and Galliers, R. D. (2004), Towards a Diffusion Model for internet systems. *Internet Research,* 14(2), pp. 155-166.

Landau, S.and Everitt, B. S. (2004), A *Handbook of Statistical Analysis Using SPSS*. New York: Chapman & Hill.

Lacovou, C., Benbasat, I., and Dexter, A. (1995), Electronic data interchange and small organizations: Adoption and impact technology. *MIS Quarterly*, pp. 465-485

Lucey, T. (1997): *Management Information Systems LEHS Educational*, London, 8th Edition.

Malhotra, P and Singh, B.(2006), The impact of internet banking on bank's performance :The Indian experience, *South Asian Journal of Management,* Oct. http://www.encyclopedia.com/doc/1P3-1230716941.html , retrieved on May 5, 2009.

Mboma, L.M (2006), ATM and customer satisfaction: A case of the banking industry in Tanzania, *The African Journal Finance and Management,* 15(1) pp 48-70.

Molla, A. & Licker, P. S. (2005), Commerce adoption in developing countries: A model and instrument information and Management, 42, pp. 877-899.

Montealegre, R. (1996), Implication of electronic commerce for managers in developing countries, *Information Technology for Development,* 7(3), pp. 145-153

Mohammad T. (2004*), Problems* and prospects of internet marketing*" Journal of Internet Banking and Commerce*, 9(1).

Oghenerukeybe, E.A (2009), Customers perception of security indicators in online banking sites in Nigeria, *Journal of Internet Banking and Commerce, 14(1), http*://www.arraydev.com/commerce/jibc

Ojo A. T. (2004), Enhancing the Efficiency of the Payment System: Conceptual Framework: A paper Presented at the 9th CBN Monetary Policy Forum, Abuja May 2004.

Olesin A. (2006), E-Payment-Stockholders Berried Over Switching System, The Punch Newspaper, May 2006.

Oluyemi, S. A. (2001), Development of electronic banking in Nigeria: The associated regulatory/ supervisory challenges, *Nigerian Deposit Insurance Corporation Quarterly,* 11(3/4) pp36-60

Ovia J. (2006), Payment system and financial innovations, A Paper Presented at the Annual Policy Conference, Nov. 2002.

Pilat, D.(2002), OECD work on ICT and business performance – the role of data linking, 17th Voorburg Meeting on Service Statistics Nantes

Poon, S., and Sweatman, P.M.C. (1999), An exploratory study of small business internet commerce information & management, 35 (1), pp. 9-18

Royers, E. M. (1995), *Diffusion of Innovation (4ed.)* New York: Free Press.

Spanos, Y. E., Prastacos, G. P. & Poulymenakou, A. (2002), The Relationship Between Information and Communication Technologies Adoption and Management Information and Management, 39, pp 659-675.

Stiglitz, J. E. (1998), Economic organization, information and development., *A Handbook of Development Economics*, 1 pp. 93-160

Thong, J. (1999): An integrated model of information systems in small Business. *Journal of Management Systems,* 15(4), 187- 214

Tolbert, P. S. and Zucker, L. G. (1983), Institutional sources of change in the formal structure of organizations: The diffusion of civil service reform, 1880-1935, *Administrative Science Quarterly,* 28, pp. 23-29

Tornatzky, L. G., and Fleischer, M. (1990), *The Process of Technological Innovation*. Lexiington M A: Lexington Books.

Turban, E., King, D., Lee, J., and Viehland, D. (2004), Electronic commerce: A management perspective. New Jersey.

Wenninger, J. (2000), The emerging role of banks in e-commerce. *Current Issues in Economic s and Finance,* 6(3).

World Bank Group (2006), *Information and communications for development: Global trends and policie*s, Washington: Communications Technologies Department, pp 303.

Wu, D. (2006), Detecting information technology on firm performance using DEA and decision trees, *International Journal of Information Technology and Management* 5(2/3), http://porta.acm.org/citation.cfm?id

Zwass, V. (2003), Electronic commerce and organizational innovation: Aspects and opportunities, *International Journal*

Table 1: Banks Annual Figures For Total Credit, Investment, Demand Deposit, Savings, Time Deposit, Total Deposit and Total Foreign Currency Reserve Of Commercial Banks in Nigeria, 1970-2008.

YEAR	PRE-TOCR(N'000	PRE-TOTNVST N'000	PRE-DDEPOT N'000	PRE-SAV N'000	PRE-TMDPOT N'000	PRE-TOTDEP N'000	PRE-FORCURN N'000
1970	351.4	533.8	288.1	207	129.7	1510	624.8
1971	S502	342.9	285.3	211.4	160.4	1502	657.1
1972	639.5	418.5	336.9	255.9	200.9	1851.7	793.7
1973	735.5	424.4	430.7	357.8	224.5	2172.9	1013
1974	938.1	778.3	720.7	686.5	266.7	3390.3	1693.9
1975	1537.3	832	1266.8	1051.1	521.3	5208.5	2839.2
1976	2122.9	1391.1	2185.2	1270	709.2	7678.4	4164.4
1977	3074.7	2016.5	2980.1	1325	930.1	10326.4	5235.2
1978	4109.8	1573.5	2700.9	1526	1075.7	10985.9	5302.6
1979	4618.7	2628.4	3265.7	2418.3	1283.8	14214.9	6967.8
1980	6379.2	344.8	4845.9	3573.7	1589.5	16733.1	10009.1
1981	8604.8	2350.2	4880.9	3816.8	1979.2	21631.9	10676.9
1982	10277	3406.9	5180.7	4517	2321.2	25702.8	12018.9
1983	11100	5730.4	5855.6	5203.6	2879.3	30768.9	13938.5
1984	11503.4	9237.8	6343.5	6030	3381.3	36496	15734.8
2985	12170.3	10875.8	7046.2	3699.9	6851	40643.2	17597.1
1986	15701.5	5223.3	6649.8	4270.2	7217.6	39062.4	18137.6
1987	17531.9	8712.6	7998	5206.7	9882	49331.2	23086.7
1988	20044.9	7565.2	10667.9	7122.7	11274.5	56675.2	29065.1
1989	22221.2	4606.4	10188	9237.8	7739.1	53992.5	27164.9
1990	26083.9	10067.8	15588.8	13013.5	10175	74929	38777.3
1991	31762.4	7453.5	22849	19395.3	10964.4	92424.6	53208.7

YEAR	POST-TOCR N'000	POST-TOTNVST N'000	POST-DDEPOT N'000	POST-SAV N'000	POST-TMDPOT N'000	POSTTOTDEP N'000	POST-FORCURN N'000
1992	41810	6767	33263.5	26071.1	15713.1	123624.7	75047.7
1993	48056	31192	49923.6	37054.8	23475.2	189701.6	110453.6
1994	92624	40444	65348.7	49601.1	25889.5	273907.3	142537.5
1995	141146	22695	79469.5	62135	29965.4	335410.9	178962.1
1996	169242	49751	95904	68776.9	43999.8	427673.7	214359.8
1997	230600	42861.5	133335.9	85264.1	55921	547982.5	280028.6
1998	272895.5	52993.8	142252.1	101373.5	61263.2	630778.1	314303.5
1999	353081.1	193412.9	202152.1	128365.8	110765.1	987777	476350.9
2000	508302.2	285294.4	345001.4	154406	164624.2	1457628.2	702104.5
2001	796164.8	192731.8	470067.3	217576.8	240682.9	1917223.6	47198.4
2002	954628.8	435601	544699.6	244821.7	311189	2490940.1	1209747.3
2003	1210033.1	434299	638733.1	313204.4	342535.3	2938804.9	1417060
2004	1519242.7	677957.4	808657.5	359471.5	438045.7	3803374.8	1778713
2005	1870772.6	799897.8	989991.2	393203.3	571622.2	4625487.1	1159746.5
2006	2385643.4	895489.3	1201397.5	468881.7	770708.7	5722120.6	1604174.5
2007	2504925.6	940263.8	1261467.4	492325.8	809244.1	6008226.7	1684383.2
2008	2630171.8	98727	1299311.4	516942	849706.3	5394858.5	1718070.9

Source: CBN Statistical Bulletin (Various Years).

Table 2: Summary of Results of the Influence of ICT on the Performance of Nigerian Commercial Banks

VARIABLE	X_1 Total Credit TOCR	X_2 Total Investment TOTNVST	X_3 Total Demand Deposit DDEPOT	X_4 Total Savings SAV	X_5 Total Time Deposit TMDPOT	X_6 Total Deposit TOTDEP	X_7 Total Foreign Currency FORCURN
T-statistic calculated	4.66***	4.30***	4.97***	5.85**	4.47***	4.88***	5.30***
T-statistic Tabulated 1%	2.7045	2.7045	2.7045	2.7045	2.7045	2.7045	2.7045
T-statistic Tabulated 5%	2.0211	2.0211	2.0211	2.0211	2.0211	2.0211	2.0211
DECISION	Significant	Significant	Significant	Significant	Significant	Significant	Significant
Level of significance	***	***	***	***	***	***	***

NB: *=Significant at 1%; ** =Significant at 5% ; NS= Not significant**

APPENDICE

Hypothesis Test: Independent Groups

PRE-TOCR	POST-TOCR	
9,636.8364	925,255.2705882	Mean
9,197.1908	925,987.5328337	std. dev.
22	17	N
	37	Df
	-915,618.4342246	difference (PRE-TOCR - POST-TOCR)
	370,838,457,570.7670000	pooled variance
	196,647.7064241	standard error of difference
	0.0000000	hypothesized difference
	-4.66	T
	2.03E-05	p-value (one-tailed)
	4.06E-05	p-value (two-tailed)

Hypothesis Test: Independent Groups

PRE-TOTNVST	POST-TOTNVST	
3,932.4591	305,904.6294	Mean
3,582.3234	330,623.2654	std. dev.
22	17	N
	37	Df
	-301,972.1703	difference (PRE-TOTNVST - POST-TOTNVST)
	47,277,226,817.7986	pooled variance
	70,213.8035	standard error of difference
	0.0000	hypothesized difference
	-4.30	T
	.0001	p-value (one-tailed)

Hypothesis Test: Independent Groups

PRE-DDEPOT	POST-DDEPOT	
5,570.6682	491,822.1058824	Mean
5,523.4957	460,413.6443642	std. dev.
22	17	N
	37	Df
	-486,251.4377005	difference (PRE-DDEPOT - POST-DDEPOT)
	91,684,655,993.8156000	pooled variance
	97,778.8291084	standard error of difference
	0.0000000	hypothesized difference
	-4.97	T
	7.67E-06	p-value (one-tailed)
	1.53E-05	p-value (two-tailed)

Hypothesis Test: Independent Groups

PRE-SAV	POST-SAV	
4,290.7364	218,792.6765	Mean
4,681.2009	172,453.3066	std. dev.
22	17	N
	37	Df
	-214,501.9401	difference (PRE-SAV - POST-SAV)
	12,873,039,834.1211	pooled variance
	36,638.4472	standard error of difference
	0.0000	hypothesized difference
	-5.85	T
	4.94E-07	p-value (one-tailed)
	9.88E-07	p-value (two-tailed)

Hypothesis Test: Independent Groups

PRE-TMDPOT	POST-TMDPOT	
3,716.2000	286,197.1000	Mean
4,022.6871	297,878.4610	std. dev.
22	17	N
	37	Df
	-282,480.9000	difference (PRE-TMDPOT - POST-TMDPOT)
	38,379,596,292.2032	pooled variance
	63,262.5514	standard error of difference
	0.0000	hypothesized difference
	-4.47	T
	3.63E-05	p-value (one-tailed)
	.0001	p-value (two-tailed)

Hypothesis Test: Independent Groups

PRE-TOTDEP	POSTTOTDEP	
27,146.9000	2,227,971.7823529	Mean
25,735.9799	2,123,654.0352233	std. dev.
22	17	N
	37	Df
	-2,200,824.8823529	difference (PRE-TOTDEP - POSTTOTDEP)
	##########	pooled variance
	451,004.8911344	standard error of difference
	0.0000000	hypothesized difference
	-4.88	T
	1.02E-05	p-value (one-tailed)
	2.04E-05	p-value (two-tailed)

Hypothesis Test: Independent Groups

PRE-FORCURN	POST-FORCURN	
13,577.6045	771,367.1470588	mean
13,747.3410	672,818.8738013	std. dev.
22	17	n
	37	df
	-757,789.5425134	difference (PRE-FORCURN - POST-FORCURN)
	195,863,042,383.6140000	pooled variance
	142,913.3338678	standard error of difference
	0.0000000	hypothesized difference
	-5.30	t
	2.76E-06	p-value (one-tailed)
	5.52E-06	p-value (two-tailed)